

REMARKS

This Amendment responds to the Office Action mailed May 30, 2008, in the above-identified application. For the following reasons, careful reconsideration and allowance of the application are respectfully requested.

Claims 1, 3-6, 8-22, 25 and 26 are pending in the application. Claims 13-22, 25 and 26 have been withdrawn from consideration (but see comments below). Claims 1, 3-6 and 8-12 are currently under consideration. No claims have been amended. Claims 1, 6, 11 and 12 are independent claims. The pending claims are listed above for the convenience of the Examiner.

As indicated previously, withdrawn claim 13 depends from claim 1, withdrawn claim 18 depends from claim 6, withdrawn claim 25 depends from claim 11, and withdrawn claim 26 depends from claim 12. Accordingly, claims 13-22, 25 and 26 depend from elected claims and should be allowable upon allowance of the respective parent claims.

The Examiner asserts that the Information Disclosure Statement filed May 2, 2008 fails to comply with 37 C.F.R. §1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in §1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The Examiner refers to documents JP H9-223997 and JP 2000-131413 listed in the Foreign Patent Document section. However, page 2 of the Information Disclosure Statement states that U.S. 5,991,280 is an English language equivalent of JP H9-223997 and that U.S. 6,229,477 is an English language equivalent of JP 2000-131413. The U.S. equivalents of the Japanese documents are listed on the Information Disclosure Statement. Thus, the relevance of the documents is provided in the form of an English language equivalent of each Japanese document. Accordingly, it is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. §1.98(a)(3), and an indication to this effect is respectfully requested.

Claims 1, 6, 11, 12, 3, 4, 5, 8, 9 and 10 are rejected under 35 U.S.C. §103(a) as unpatentable over Enge et al. (WO 96/22546) in view of Gross et al. (US 6,556,809). The rejections are respectfully traversed for the following reasons.

Enge relates to a differential GPS augmentation system using a network of reference base stations. The system includes means for providing GPS satellite ephemeris and clock corrections to users, wherein the corrections are sent to users from a network of reference stations, through a master station.

Gross relates to a satellite cellular communication system including one satellite 110 (FIG. 1) communicating with communication devices 130 within a satellite footprint 144. Within the footprint 144, multiple "beamlets" 140 are projected by satellite 110 toward the ground (column 3, lines 15-17). Multiple beamlets 140 may be combined to form beams 142 (column 3, lines 24-25).

Applicant's claim 1 is directed to a system for providing a common time base between different locations on earth, comprising a first spacecraft carrying a first component of a communication channel, wherein the position of said first spacecraft is known, a plurality of receiving stations at different locations on earth, wherein each receiving station is adapted to receive a first reference signal from said first component, synchronization means adapted to provide a synchronized time base between the plurality of receiving stations, and correction means adapted to correct the synchronization error of the synchronized time base by the known position of the first spacecraft and in accordance with the propagation time of each received first reference signal. At least one receiving station comprises a correlation receiver yielding a correlation gain for receiving the first reference signal, wherein the first spacecraft transmits in a main narrow spot beam and wherein the correlation receiver is suitable for receiving the first reference signal outside the main narrow spot beam of the first spacecraft.

Embodiments of the present invention relate to a system for applying orbit corrections to satellites (page 1, lines 27-30). The position and movement of the satellites are determined by a pseudo ranging configuration (page 7, line 30 to page 8, line 2 and page 12, lines 30-31) which

requires time synchronization between the receiving stations (page 8, lines 5-8 and page 12, lines 32-33). Embodiments of the invention provide a system which can be operated efficiently when the satellite uses a narrow spot beam transmission.

To this end, at least one receiving station comprises a correlation receiver providing a correlation gain for receiving the reference signals with sufficient accuracy in a narrow spot beam transmission context. The reference signal can be received outside the main narrow spot beam of the satellite or footprint of the spot beam (page 13, lines 24-28; page 23, lines 29-33; and page 36, lines 28-32), the reference station can be located outside the coverage area of the payload signal (page 13, lines 1-4), and the large angle intersection therefore leads to a higher accuracy. This feature is not disclosed or suggested by the cited prior art.

In embodiments of the invention, the correlation receiver at a receiving station provides an improved system for determining the position and movement of a satellite by a pseudo ranging configuration and time synchronization when the satellite uses a narrow spot beam transmission. The provision of a correlation receiver at the receiving station permits the reference signal to be received outside the narrow spot beam footprint where the payload signal is received. Therefore, receiving stations can be located farther apart, and the uncertainty of measurement is reduced. The correlation receiver is configured to yield a correlation gain for receiving the reference signal for a pseudo ranging configuration and timing synchronization.

Applicant submits that the claimed system for providing a common time base between different locations on earth as defined by claim 1 is not disclosed or suggested by Enge in view of Gross. First, Enge and Gross do not relate to the same technical field. Enge relates to a differential GPS system with augmentation properties, and therefore relates to a global navigation satellite system (GNSS) for providing positioning with global coverage. By contrast, Gross relates to a satellite cellular communication system. Enge relates to positioning rather than communication, while Gross relates to communication rather than positioning. A skilled person would recognize that the constraints in these two fields are different. Satellite positioning is essentially focused on obtaining very accurate knowledge of all spatial and timing quantities of

the constituent elements of the system, while satellite communication is mainly focused on maximizing the efficient use and bandwidth of the communication channel.

Second, the claimed invention would not have been obvious because the skilled person is not faced with any satellite radiation pattern limitation in Enge. GPS is intended for global positioning, and each GPS satellite is intended to cover the entire visible earth surface. Satellite visibility is an important design aspect of the GPS system, since each additional visible satellite provides data that improves positioning precision. This is in stark contrast with a satellite communication system wherein each additional visible satellite causes additional interference. The skilled person would not have combined Enge with Gross, since Enge is completely silent on radiation pattern directionality. Radiation directionality would be undesirable in Enge.

Third, even assuming for the sake of argument that the skilled person would have combined Enge with Gross, the skilled person would not have arrived at the claimed invention. Indeed, Gross does not disclose a receiving station comprising a correlation receiver suitable for receiving a reference signal outside the main narrow spot beam of a spacecraft. Gross does not disclose such a correlation receiver and neither discloses receiving a reference signal nor receiving the reference signal outside the main narrow spot beam of a spacecraft. Gross in FIG. 1 discloses a satellite footprint 144 wherein all receiving operations occur within the footprint. In addition, the beamlets 140 are designed to be dimensionally narrow and to have poor sidelobe characteristics (column 3, lines 19-22). Gross therefore teaches away from the invention by specifically and intentionally designing the beamlets to avoid sidelobe communication.

Gross in FIG. 7 and column 8, lines 27-46 does not disclose using a correlation receiver on the receiving side to receive a reference signal outside the main narrow spot beam of a spacecraft. Instead, FIG. 7 relates to forming a synchronization beam by the satellite on the transmitting side.

For at least these reasons, claim 1 is clearly and patentably distinguished over Enge in view of Gross, and withdrawal of the rejection is respectfully requested.

Claims 3-5 depend from claim 1 and are patentable over Enge in view of Gross for at least the same reasons as claim 1.

Claim 6 is directed to a method for providing a common time base between different locations on earth with the aid of a spacecraft and contains method limitations that parallel the apparatus limitations of claim 1. Claim 6 is distinguished over Enge in view of Gross for the reasons discussed above in connection with claim 1. For at least these reasons, claim 6 is clearly and patentably distinguished over Enge in view of Gross, and withdrawal of the rejection is respectfully requested.

Claims 8-10 depend from claim 6 and are patentable over Enge in view of Gross for at least the same reasons as claim 6.

Claim 11 is directed to a processing station for providing a common time base between different locations on earth with the aid of a spacecraft and requires, in part, propagation time data receiving means adapted to receive propagation time data from a plurality of receiving stations at different locations on earth, and correction means adapted to correct a synchronization error of the synchronized time base by the known position of the spacecraft in accordance with the propagation time of each received reference signal. At least one receiving station comprises a correlation receiver yielding a correlation gain for receiving the reference signal. The spacecraft transmits in a main narrow spot beam, and the correlation receiver is suitable for receiving the reference signal outside the main narrow spot beam of the spacecraft.

As discussed above, Enge in view of Gross contain no disclosure or suggestion of a correlation receiver and no disclosure or suggestion of a spacecraft that transmits in a narrow spot beam, wherein the correlation receiver receives the reference signal outside the main narrow spot beam of the spacecraft. For at least these reasons and for the reasons discussed above, claim 11 is clearly and patentably distinguished over Enge in view of Gross, and withdrawal of the rejection is respectfully requested.

Claim 12 is directed to a processing method for providing a common time base between different locations on earth with the aid of a spacecraft and contains method limitations that parallel the apparatus limitations of claim 11. Claim 12 is clearly patentable over Enge in view of Gross for the reasons discussed above in connection with claims 1, 6 and 11, and withdrawal of the rejection is respectfully requested.

Based upon the above discussion, claims 1, 3-6, 8-22, 25 and 26 are in condition for allowance.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Dated: August 20, 2008

Respectfully submitted,

By William R. McClellan
William R. McClellan
Registration No.: 29,409
WOLF, GREENFIELD & SACKS, P.C.
Federal Reserve Plaza
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
(617) 646-8000